

AMENDMENTS TO THE CLAIMS

1. (Original) A radiation detection instrument comprising:
 - a mobile communications device having wireless means for communicating over a wireless communications network;
 - a radiation detector operably connected to said mobile communications device; and
 - means for analyzing data collected by the radiation detector and displaying said data via the mobile communications device.
2. (Original) The instrument of claim 1,
 - wherein said mobile communications device is a cellular phone.
3. (Original) The instrument of claim 1,
 - wherein said wireless means is adapted to communicate with a data server of a central monitoring system over the wireless communications network.
4. (Original) The instrument of claim 3,
 - wherein said wireless means is adapted to access the Internet using a web-based protocol for data transmission.

5. (Original) The instrument of claim 3,

wherein said wireless means is adapted to access the Internet using

an always-on mobile Internet connection system.
6. (Original) The instrument of claim 3,

wherein said mobile communications device is adapted to

automatically transmit the data in real time to the data server of the

central monitoring system.
7. (Original) The instrument of claim 3,

wherein data is encrypted for transmission to the data server of the

central monitoring system.
8. (Original) The instrument of claim 3,

wherein said radiation detector is adapted to measure the

individual energies of detected photons.
9. (Original) The instrument of claim 8,

wherein data is transmitted by said mobile communications device

to the data server of the central monitoring system in list mode to preserve

full information content.

10. (Original) The instrument of claim 1,
further comprising a locator operably connected to said mobile communications device for determining the location of said instrument.
11. (Original) The instrument of claim 10,
wherein said locator is a coordinate locator based on an absolute coordinate system of location identification.
12. (Original) The instrument of claim 11,
wherein said coordinate locator is a GPS receiver.
13. (Original) The instrument of claim 10,
wherein the radiation detector is adapted to measure the individual energies of detected photons, and the locator determines the location of said instrument associated with each detected photon.
14. (Original) The instrument of claim 13,
further comprising a clock-calendar operably connected to said mobile communications device for determining the detection time-date associated with each detected photon.

15. (Original) The instrument of claim 14,

wherein said mobile communications device is adapted to transmit data of the individual photon energies and the corresponding detection time-date and detection location associated with each to a data server of a central monitoring system.

16. (Original) The instrument of claim 1,

wherein said radiation detector comprises a room temperature-operable solid state semiconductor material for measuring gamma-ray photons and/or neutrons.

17. (Original) The instrument of claim 16,

wherein said radiation detector is formed from a material selected from a group consisting of cadmium zinc telluride, cadmium telluride, mercuric iodide, lead iodide and aluminum antimonide.

18. (Original) The instrument of claim 16,

wherein said radiation detector is pixelated.

19. (Original) The instrument of claim 18,

wherein pixels located in regions of the detector having imperfections are disabled to improve overall detector resolution.

20. (Original) The instrument of claim 16,
wherein the radiation detector material is of a commercial grade
having low spectral resolution when operated as a single-crystal detector.
21. (Original) The instrument of claim 1,
wherein said radiation detector is interconnected to a low-power
VLSI readout.
22. (Original) The instrument of claim 1,
wherein said means for analyzing and displaying data includes
means for identifying isotopes from the detected photon energies.
23. (Original) The instrument of claim 22,
further comprising means for alerting a user upon isotope
detection.
24. (Original) The instrument of claim 23,
wherein the means for alerting is adapted to be triggered when a
predetermined level of radiation is detected.

25. (Original) The instrument of claim 24,

wherein the means for alerting is adapted not to be triggered when a benign isotope is identified, despite detection of the predetermined level of radiation,

26. (Original) A radiation detection instrument comprising:

a mobile communications device having wireless means for communicating with a data server of a central monitoring system over a wireless communications network;

a radiation detector operably connected to said mobile communications device for measuring the individual energies of detected photons;

a clock-calendar operably connected to said mobile communications device for determining the time-date associated with each detected photon; and

a locator operably connected to said mobile communications device for determining the location of said instrument associated with each detected photon,

wherein said mobile communications device is adapted to transmit data of the individual photon energies and the corresponding detection time-date and detection location associated with each to the data server of said central monitoring system.

27. (Original) The instrument of claim 26,
wherein said mobile communications device is a cellular phone.
28. (Original) The instrument of claim 26,
wherein the wireless means is adapted to access the Internet using
a web-based protocol for data transmission.
29. (Original) The instrument of claim 26,
wherein said wireless means is adapted to access the Internet using
an always-on mobile Internet connection system.
30. (Original) The instrument of claim 26,
wherein said mobile communications device is adapted to
automatically transmit the data in real time to the data server of the
central monitoring system.
31. (Original) The instrument of claim 26,
wherein data is transmitted by said mobile communications device
in list mode to preserve full information content.

32. (Original) The instrument of claim 26,
wherein data is encrypted for transmission to the data server of the
central monitoring system.
33. (Original) The instrument of claim 26,
wherein said locator is a coordinate locator based on an absolute
coordinate system of location identification.
34. (Original) The instrument of claim 33,
wherein said coordinate locator is a GPS receiver.
35. (Original) The instrument of claim 26,
wherein said radiation detector comprises a room temperature-
operable solid state semiconductor material for measuring gamma-ray
photons and/or neutrons.
36. (Original) The instrument of claim 35,
wherein said radiation detector is formed from a material selected
from a group consisting of cadmium zinc telluride, cadmium telluride,
mercuric iodide, lead iodide and aluminum antimonide.

37. (Original) The instrument of claim 35,
wherein said radiation detector is pixelated.
38. (Original) The instrument of claim 37,
wherein pixels located in regions of the detector having
imperfections are disabled to improve overall detector resolution.
39. (Original) The instrument of claim 35,
wherein the radiation detector material is of a commercial grade
having low spectral resolution when operated as a single-crystal detector.
40. (Original) The instrument of claim 26,
wherein said radiation detector is interconnected to a low-power
VLSI readout.
41. (Original) The instrument of claim 26,
further comprising means for identifying isotopes from the
detected photon energies.
42. (Original) The instrument of claim 41,
further comprising means for alerting a user upon isotope
detection.

43. (Original) The instrument of claim 42,

wherein the means for alerting is adapted to be triggered when a predetermined level of radiation is detected.

44. (Original) The instrument of claim 43,

wherein the means for alerting is adapted not to be triggered when a benign isotope is identified, despite detection of the predetermined level of radiation.

45. (Original) A radiation detection network, comprising:

a central monitoring system having a data server connected to a wireless communications network; and

a plurality of radiation detection instruments widely distributed in a geographic region, each instrument comprising: a mobile communications device having wireless means for communicating with the data server of the central monitoring system over the wireless communications network; a radiation detector operably connected to said mobile communications device for measuring the individual energies of detected photons; a clock-calendar operably connected to said mobile communications device for determining the time-date associated with each detected photon; and a locator operably connected to said mobile

communications device for determining the location of said instrument associated with each detected photon, said mobile communications device adapted to transmit data of the individual photon energies and the corresponding detection time-dates and detection locations associated with each to the data server of said central monitoring system,

wherein said central monitoring system includes means for collectively analyzing said data received from the plurality of radiation detection instruments, whereby a radiation source(s) may be identified and/or tracked.

46. (Original) The network of claim 45,

wherein the mobile communications device of each instrument is a cellular phone.

47. (Original) The network of claim 45,

wherein the wireless means of each instrument is adapted to access the Internet using a web-based protocol for data transmission.

48. (Original) The network of claim 45,

wherein the wireless means of each instrument is adapted to access the Internet using an always-on mobile Internet connection system.

49. (Original) The network of claim 45,

wherein said mobile communications device of each instrument is adapted to automatically transmit the data in real time to the data server of the central monitoring system.

50. (Original) The network of claim 45,

wherein data is transmitted by said mobile communications device of each instrument to the data server of the central monitoring system in list mode to preserve full information content.

51. (Original) The network of claim 45,

wherein data is encrypted for transmission by each instrument to the data server of the central monitoring system.

52. (Original) The network of claim 45,

wherein said locator of each instrument is a coordinate locator based on an absolute coordinate system of location identification.

53. (Original) The network of claim 52,

wherein said coordinate locator is a GPS receiver.

54. (Original) The network of claim 45,

wherein said radiation detector of each instrument comprises a room temperature-operable solid state semiconductor material for measuring gamma-ray photons and/or neutrons.

55. (Original) The network of claim 54,

wherein said radiation detector of each instrument is formed from a material selected from a group consisting of cadmium zinc telluride, cadmium telluride, mercuric iodide, lead iodide and aluminum antimonide.

56. (Original) The network of claim 54,

wherein said radiation detector of each instrument is pixelated.

57. (Original) The network of claim 56,

wherein pixels located in regions of the detector having imperfections are disabled to improve overall detector resolution.

58. (Original) The network of claim 54,

wherein the radiation detector material is of a commercial grade having low spectral resolution when operated as a single-crystal detector.

59. (Original) The network of claim 45,

wherein said radiation detector of each instrument is
interconnected to a low-power VLSI readout.

60. (Original) The network of claim 45,

wherein each instrument further comprises means for identifying
isotopes from the detected photon energies.

61. (Original) The network of claim 60,

wherein each instrument further comprises means for alerting a
user upon isotope detection.

62. (Original) The network of claim 61,

wherein for each instrument the means for alerting is adapted to be
triggered when a predetermined level of radiation is detected.

63. (Original) The network of claim 62,

wherein for each instrument the means for alerting is adapted not
to be triggered when a benign isotope is identified, despite detection of
the predetermined level of radiation.

64. (Original) The network of claim 45,

wherein said means for collectively analyzing the radiation and location data looks for correlations and deviations from background radiation.

65. (Original) A method of regional radiation monitoring comprising the steps of:

widely distributing a plurality of radiation detection instruments in a region, with each instrument comprising a mobile communications device having wireless means for communicating over a wireless communications network; a radiation detector operably connected to said mobile communications device for measuring the individual energies of detected photons; a clock-calendar operably connected to said mobile communications device for determining the time-date associated with each detected photon; and a locator operably connected to said mobile communications device for determining the location of said instrument associated with each detected photon,

on a data server of a central monitoring system connected to the wireless communications network: receiving data of the individual photon energies and the corresponding detection time-date and detection location associated with each from the plurality of radiation detection instruments in the region; and

collectively analyzing said received data whereby a radiation source(s) may be identified and/or tracked.

66. (Original) The method of claim 65,
wherein said collective analysis includes looking for correlations and deviations from background radiation.
67. (Original) The method of claim 65,
wherein said collective analysis produces a multi-dimensional map of the background radiation in the region, the energy dependence of the background radiation, and variations in background radiation as a function of associated detection parameters.
68. (Original) The method of claim 67,
wherein said associated detection parameters include detection time and detection location.
69. (Original) The method of claim 65,
wherein data is received from said instruments via the Internet using a web-based protocol for data transmission.

70. (Original) The method of claim 65,
wherein data is received from said instruments via the Internet
using an always-on mobile Internet connection system.
71. (Original) The method of claim 65,
wherein data is received in real time by the data server of the
central monitoring system due to the automatic data transmission from
each instrument.
72. (Original) The method of claim 65,
wherein data is received in list mode to preserve full information
content.
73. (Original) The method of claim 65,
wherein data is received encrypted.
74. (Original) The method of claim 65,
further comprising, upon receiving radiation data indicating a
radiation source, utilizing said mobile communications device to
communicate with users of said instruments to reconfigure the network.

75. (Original) The method of claim 65,

further comprising, upon receiving radiation data indicating a consequence management scenario, utilizing said mobile communications device to provide system-wide support to users of said instruments by coordinating and/or organizing consequence management efforts.

76. (Previously presented) A portable detection instrument comprising:

a mobile communications device having wireless means for communicating over a wireless communications network;

an application-specific sensor connected to said mobile communications device for detecting application-specific parameters, wherein the application is chosen from the group consisting of radiation, chemical, temperature, shock, motion, aural, and visual detections; and

means for analyzing data collected by the application-specific sensor and displaying said data via the mobile communications device.

77. (Previously presented) A portable detection instrument comprising:

a mobile communications device having wireless means for communicating with a data server of a central monitoring system over a wireless communications network;

an application-specific sensor operably connected to said mobile communications device for measuring application-specific parameters,

wherein the application is chosen from the group consisting of radiation, chemical, temperature, shock, motion, aural, and visual detections;

a clock-calendar operably connected to said mobile communications device for determining the time-date associated with each unit of the application-specific parameter; and

a locator operably connected to said mobile communications device for determining the location of said instrument associated with each unit of the application-specific parameter, wherein said mobile communications device is adapted to transmit data of the individual units of the application-specific parameter and the corresponding detection time-date and detection location associated with each to the data server of said central monitoring system.

78. (Previously presented) A wide-area detection network, comprising:

a central monitoring system having a data server connected to a wireless communications network; and

a plurality of detection instruments widely distributed in a geographic region, each instrument comprising: a mobile communications device having wireless means for communicating with the data server of the central monitoring system over the wireless communications network; an application-specific sensor operably connected to said mobile communications device for measuring application-specific parameters,

wherein the application is chosen from the group consisting of radiation, chemical, temperature, shock, motion, aural, and visual detections; a clock-calendar operably connected to said mobile communications device for determining the time-date associated with each unit of the application-specific parameter; and a locator operably connected to said mobile communications device for determining the location of said instrument associated with each unit of the application-specific parameter, said mobile communications device adapted to transmit data of the individual units of the application-specific parameter and the corresponding detection time-dates and detection locations associated with each to the data server of said central monitoring system,

wherein said central monitoring system includes means for collectively analyzing said data received from the plurality of radiation detection instruments, whereby an application-specific source(s) may be identified and/or tracked.

79. (Previously presented) A method of regional monitoring comprising the steps of:

widely distributing a plurality of application-specific detection instruments in a region wherein the application is chosen from the group consisting of radiation, chemical, temperature, shock, motion, aural, and visual detections, with each instrument comprising a mobile

communications device having wireless means for communicating over a wireless communications network; an application-specific sensor operably connected to said mobile communications device for measuring an application-specific parameter; a clock-calendar operably connected to said mobile communications device for determining the time-date associated with each unit of the application-specific parameter; and a locator operably connected to said mobile communications device for determining the location of said instrument associated with each unit of the application-specific parameter,

on a data server of a central monitoring system connected to the wireless communications network: receiving data of the individual units of the application-specific parameter and the corresponding detection time-date and detection location associated with each from the plurality of detection instruments in the region; and

collectively analyzing said received data whereby an application-specific source(s) may be identified and/or tracked.

80. (New) A radiation sensor module comprising:

a radiation detector made of a room temperature-operable, solid state semiconductor detection material capable of detecting gamma-ray photons and/or neutrons, and pixelated into a plurality of small pixels wherein pixels located in regions of the detection material having

imperfections are individually disabled to enhance detector performance and high spectral resolution.

81. (New) The radiation sensor module of claim 80,

further comprising a readout having a plurality of channels connected to the pixels for electronically processing detection data obtained therefrom.

82. (New) The radiation sensor module as in claim 81,

wherein the pixels located in said regions having imperfections are individually disabled by connecting the plurality of channels of said readout only to the pixels in regions without imperfections.

83. (New) The radiation sensor module as in claim 82,

wherein said regions having imperfections are low performance regions.

84. (New) The radiation sensor module as in claim 83,

wherein said low performance regions are characterized by low resistivity whereby disabling said low performance regions reduces power drain.

85. (New) The radiation sensor module as in claim 81,

further comprising an interface board, and

wherein the readout is an ASIC readout chip mounted on the interface board together with said radiation detector, with the ASIC

readout chip and said radiation detector connected to each other by interconnects on the interface board.

86. (New) The radiation sensor module as in claim 85,

wherein said ASIC readout chip is a VLSI readout chip bonded to the pixels of said detection material.

87. (New) The radiation sensor module as in claim 80,

further comprising data processing means for excluding from analysis detection data obtained from the pixels in said regions having imperfections.

88. (New) The radiation sensor module as in claim 87,

wherein said data processing means includes means for setting a level of inclusion/exclusion in analysis of detection data obtained from the pixels in said regions with imperfections to provide either higher resolution or higher efficiency.

89. (New) The radiation sensor module as in claim 88,

wherein said regions having imperfections are low performance regions.

90. (New) The radiation sensor module as in claim 89,

wherein said low performance regions are characterized by low resistivity whereby disabling said low performance regions reduces power drain.

91. (New) The radiation sensor module as in claim 80,

further comprising means for adjusting the gain of each pixel to correct variations in detection material properties across the pixels of the detection material to further enhance spectral resolution.

92. (New) The radiation sensor module as in claim 91,

further comprising a temperature sensor capable of measuring the temperature of each of said plurality of pixels, wherein adjustments made by said means for adjusting the gain of each pixel are based on variations of the temperature across the pixels of said detection material determined by said temperature sensor.

93. (New) The radiation sensor module as in claim 80,

further comprising a temperature sensor capable of measuring the temperature of said detection material; and means for adjusting the overall gain of the detection material as a function of time based on the temperature measured by said temperature sensor, to improve spectral resolution of said radiation detector.

94. (New) The radiation sensor module as in claim 80,

wherein said radiation detection material is chosen from the group consisting of cadmium zinc telluride, cadmium telluride, mercuric iodide, lead iodide, and aluminum antimonide.

95. (New) The radiation sensor module as in claim 80,

wherein said radiation detection material is a commercial-grade material having low spectral resolution when operated as a single-crystal detector.

96. (New) A radiation detection system comprising:

communications means for communicating over a communications network; and

a radiation sensor module operably connected to said communications means for transmitting detection data over said communications network, said radiation sensor module including a radiation detector made of a room temperature-operable, solid state semiconductor detection material capable of detecting gamma-ray photons and/or neutrons, and pixelated into a plurality of small pixels wherein pixels located in regions of the detection material having imperfections are individually disabled to enhance detector performance and high spectral resolution.

97. (New) The radiation detection system as in claim 96,

wherein said communications means and said radiation sensor module are two modules capable of being separated from each other.

98. (New) The radiation detection system as in claim 97,

wherein said communications means and said radiation sensor module are operably connected by wires.

99. (New) The radiation detection system as in claim 97,
wherein said communications means and said radiation sensor module are operably connected via a wireless link.
100. (New) The radiation detection system as in claim 97,
wherein said radiation sensor module is attachable to an object independent of said communications means.
101. (New) The radiation detection system as in claim 96,
wherein said communications means is adapted to automatically transmit the detection data without input from a user.
102. (New) The radiation detection system as in claim 101,
wherein the automatic transmission of the detection data is in real time.
103. (New) The radiation detection system as in claim 96,
wherein said communications means is adapted to communicate with a data server of a central monitoring system over said communications network, for transmitting detection data to said data server.

104. (New) The radiation detection system as in claim 103,
wherein said communications means is adapted to automatically transmit the detection data to the data server of said central monitoring system without input from a user.
105. (New) The radiation detection system as in claim 104,
wherein the automatic transmission of the detection data is in real time.
106. (New) The radiation detection system as in claim 96,
further comprising means for analyzing detection data obtained by said radiation sensor module.
107. (New) The radiation detection system as in claim 96,
further comprising means for displaying detection data obtained by said radiation sensor module.
108. (New) The radiation detection system as in claim 96,
wherein said communications means is a mobile wireless communications device.

109. (New) The radiation detection system as in claim 96,
wherein the radiation sensor module further comprises a readout having a plurality of channels connected to the pixels for electronically processing detection data obtained therefrom.
110. (New) The radiation detection system as in claim 109,
wherein the pixels located in said regions having imperfections are individually disabled by connecting the plurality of channels of said readout only to the pixels in regions without imperfections.
111. (New) The radiation detection system as in claim 110,
wherein said regions having imperfections are low performance regions.
112. (New) The radiation detection system as in claim 111,
wherein said low performance regions are characterized by low resistivity whereby disabling said low performance regions reduces power drain.
113. (New) The radiation detection system as in claim 109,
wherein the radiation sensor module further comprises an interface board, and
wherein the readout is an ASIC readout chip mounted on the interface board together with said radiation detector, with the ASIC readout chip and said radiation detector connected to each other by interconnects on the interface board.

114. (New) The radiation detection system as in claim 113,
wherein said ASIC readout chip is a VLSI readout chip bonded to
the pixels of said detection material.
115. (New) The radiation detection system as in claim 96,
wherein the radiation sensor module further comprises data
processing means for excluding from analysis detection data obtained
from the pixels in said regions having imperfections.
116. (New) The radiation detection system as in claim 115,
wherein said data processing means includes means for setting a
level of inclusion/exclusion in analysis of detection data obtained from
the pixels in said regions with imperfections to provide either higher
resolution or higher efficiency.
117. (New) The radiation detection system as in claim 116,
wherein said regions having imperfections are low performance
regions.
118. (New) The radiation detection system as in claim 117,
wherein said low performance regions are characterized by low
resistivity whereby disabling said low performance regions reduces
power drain.

119. (New) The radiation detection system as in claim 96,
wherein the radiation sensor module further comprises means for adjusting the gain of each pixel to correct variations in detection material properties across the pixels of the detection material to further enhance spectral resolution.
120. (New) The radiation detection system as in claim 119,
wherein the radiation sensor module further comprises a temperature sensor capable of measuring the temperature of each of said plurality of pixels, wherein adjustments made by said means for adjusting the gain of each pixel are based on variations of the temperature across the pixels of said detection material determined by said temperature sensor.
121. (New) The radiation detection system as in claim 96,
wherein the radiation sensor module further comprises a temperature sensor capable of measuring the temperature of said detection material; and means for adjusting the overall gain of the detection material as a function of time based on the temperature measured by said temperature sensor, to improve spectral resolution of said radiation detector.
122. (New) The radiation detection system as in claim 96,
wherein said radiation detection material is chosen from the group consisting of cadmium zinc telluride, cadmium telluride, mercuric iodide, lead iodide, and aluminum antimonide.

123. (New) The radiation detection system as in claim 96,
wherein said radiation detection material is a commercial-grade
material having low spectral resolution when operated as a single-crystal
detector.